

# Origins of the job structure in the steel industry - Katherine Stone



Katherine Stone analyses how workers' control in the US steel industry in the 19th century was broken up by the employers using Taylorist management techniques, leading to the job structure which remains in place today.

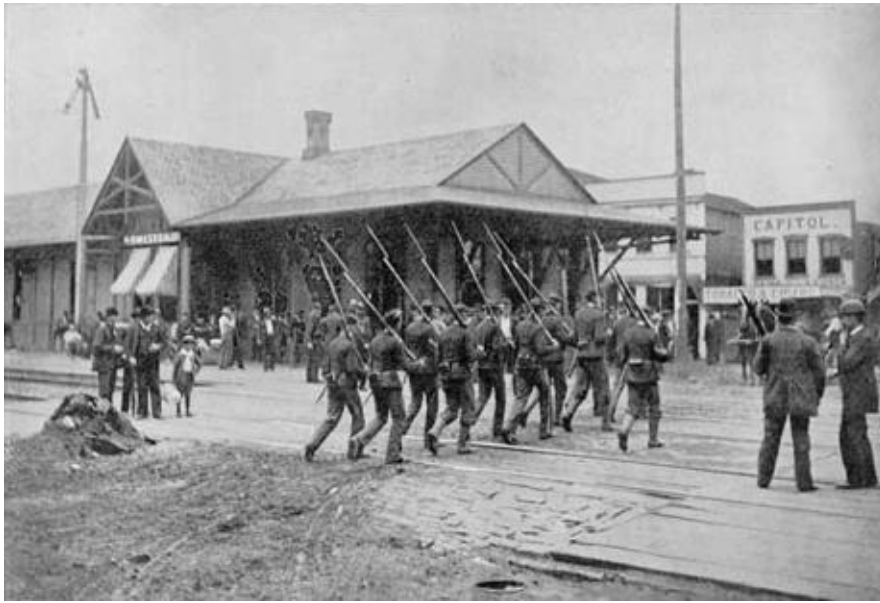
In the 19th century, work in the steel industry was controlled by the skilled workers. Skilled workers decided how the work was done and how much was produced. Capitalists played a very small role in production, and there were yet few foremen. In the last 80 years, the industry has transformed itself, so that today the steel management has complex hierarchy of authority, and steelworkers are stratified amongst minute gradings along job ladders. Steelworkers no longer make any decisions about the process of steel.

The process by which the steel industry was transformed is the process by which steel employers tried to break down the basis for unity amongst steelworkers. Out of their efforts to gain control of their workers and prevent unified opposition, the steel employers set up the various structures that define work today. This paper traces that process in detail in order to demonstrate the class nature of existing structures and the possibility for jobs to be structured differently.

## **1: The Breakdown of the Traditional Labor System**

In 1908 John Fitch, an American journalist who had interviewed hundreds of steelworkers and steel officials, described the labor system in the steel industry of his day.

In every department of mill work, there is a more or less rigid line of promotion. Every man is in a training for the next position above... The course would vary in the different styles of mills, as the positions vary in number and character, but the operating principle is everywhere the same. In the open-hearth department the line of promotion runs through common labor, metal wheelers, stock handlers, cinder-pit man, second helper and first helper, to melter foreman. In this way, the companies develop and train their own men. They seldom hire a stranger for a position as roller or heater. Thus the working force is pyramided and is held together by the ambition of the men lower down; and even a serious break in the ranks adjusts itself all but automatically.



## **Origins of the job structure in the steel**

### **industry - Katherine Stone**

Katherine Stone analyses how workers' control in the US steel industry in the 19th century was broken up by the employers using Taylorist management techniques, leading to the job structure which remains in place today.

In the 19th century, work in the steel industry was controlled by the skilled workers. Skilled workers decided how the work was done and how much was produced. Capitalists played a very small role in production, and there were yet few foremen. In the last 80 years, the industry has transformed itself, so that today the steel management has complex hierarchy of authority, and steelworkers are stratified amongst minute gradings along job ladders.

Steelworkers no longer make any decisions about the process of steel.

The process by which the steel industry was transformed is the process by which steel employers tried to break down the basis for unity amongst steelworkers. Out of their efforts to gain control of their workers and prevent unified opposition, the steel employers set up the various structures that define work today. This paper traces that process in detail in order to demonstrate the class nature of existing structures and the possibility for jobs to be structured differently.

## **I: The Breakdown of the Traditional Labor System**

In 1908 John Fitch, an American journalist who had interviewed hundreds of steelworkers and steel officials, described the labor system in the steel industry of his day.

In every department of mill work, there is a more or less rigid line of promotion. Every man is in a training for the next position above... The course would vary in the different styles of mills, as the positions vary in number and character, but the operating principle is everywhere the same. In the open-hearth department the line of promotion runs through common labor, metal wheelers, stock handlers, cinder-pit man, second helper and first helper, to melter foreman. In this way, the companies develop and train their own men. They seldom hire a stranger for a position as roller or heater. Thus the working force is pyramided and is held together by the ambition of the men lower down; and even a serious break in the ranks adjusts itself all but automatically.

Anyone familiar with industry today will recognize this arrangement immediately. It is precisely the type of internal labor market, with orderly promotion hierarchies and limited ports of entry, which economists have only recently begun to analyze. When Fitch was writing, it was a new development in American history. Only 20 years earlier, the steel industry had had a system for organizing production which appears very strange to us today.

Although steel had been produced in this country since colonial times, it was not until after the Civil War that the steel industry reached substantial size. In 1860, there were only 13

establishments producing steel, which employed a total of 748 men to produce less than 12,000 net tons of steel a year. After the Civil War, the industry began to expand rapidly, so that by 1890, there were 110 Bessemer converters and 167 open hearth converters producing 4.8 million net tons of steel per year. This expansion is generally attributed to the protective tariff for steel imports, the increased use of steel for railroads, and to changes in the technology of steel production.

The pivotal period for the U.S. steel industry was the years 1890-1910. During that period, steel replaced iron as the building block of industrial society, and the United States surpassed Great Britain as the world's prime steel producer. Also

during the 1890s, Andrew Carnegie completed his vertically integrated empire, the Carnegie Corporation, and captured 25

percent of the nation's steel market. His activities lead to a wave of corporate mergers which finally culminated in the creation, in 1901, of the world's first billion dollar corporation, the U.S. Steel Corporation. U.S. Steel was built by the financier J. P. Morgan on the back of the Carnegie Corporation. At its inception, it controlled 80 percent of the United States output of steel.

In the 19th century, the steel industry, like the iron industry from which it grew, had a labor system in which the workers contracted with the steel companies to produce steel. In this labor system, there were two types of workers- "skilled" and "unskilled." Skilled workers did work that required training, experience, dexterity, and judgment; and un-skilled workers performed the heavy manual labor-lifting, pushing, carrying, hoisting, and wheeling raw materials from one operation to the next. The skilled workers were highly skilled industrial craftsmen who enjoyed high prestige in their communities. Steel was made by teams of skilled workers with unskilled helpers, who used the companies' equipment and raw materials.

The unskilled workers resembled what we call "workers" today. Some were hired directly by the steel companies as they are today. The others were hired by the skilled workers under what was known as the "contract system." Under the contract system, the skilled workers would hire helpers out of their own paychecks. Helpers earned between one-sixth and one-half of what the skilled workers earned.

The skilled steelworkers saw production as a cooperative endeavor, where labor and capital were equal partners. The partnership was reflected in the method of wage payment. Skilled workers were paid a certain sum for each ton of steel they produced. This sum, called the tonnage rate was governed by the "sliding scale," which made the tonnage rate fluctuate with the market price of iron and steel, above a specified minimum rate below which wages could not fall. The sliding scale was introduced in the iron works of Pittsburgh as early as 1865, and in the 25 years that followed, it spread throughout the industry.

The sliding scale was actually an arrangement for sharing the profits between two partners in production, the skilled workers and the steel masters. It was based on the principle that the workers should share in the risks and the fruits of

production, benefiting when prices were high and sacrificing when prices were low.

Another effect of the sliding scale was that by pegging tonnage rates directly to market prices, the role of the employer in wage determination was eliminated. Consider, for example, the following account, summarized by David Montgomery from the records of the Amalgamated Association of Iron, Steel and Tin Workers: When the Columbus Rolling Mill Company contracted to re-heat and roll some railroad tracks in January, 1874, for example, the union elected a committee of four to consult with the plant superintendent about the price the workmen were to receive for the work. They agreed on a scale of \$1.13 per ton, which the committee brought back to the lodge for its approval.

There followed an intriguing process. The members soon accepted the company offer, then turned to the major task of dividing the \$1.13 among themselves. Each member stated his own price. When they were added up, the total was 3 cents higher than the company offer. By a careful revision of the figures, each runback buggyman was cut 2 cents, and the gang buggyman given an extra  $\frac{1}{2}$  of a cent to settle the bill.

The employers had relatively little control over the skilled workers' incomes. Nor could they use the wage as an incentive to insure them a desired level of output. Employers could only contract for a job. The price was determined by the market, and the division of labor and the pace of work was decided by the workers themselves. Thus, the sliding scale and the contract system defined the relationship between capital and labor in the steel industry in the 19th century.

The skilled steel workers had a union, the Amalgamated Association of Iron, Steel and Tin Workers, which was the strongest union of its day. Formed in 1876 by a merger of the Heaters Union, the Roll Hands Union and the Sons of Vulcan, by 1891 the Amalgamated represented 25 percent of all steelworkers. Through their union, they were able to formalize their control over production. For example, at Carnegie's Homestead, Pennsylvania mill, a contract was won in 1889 that gave the skilled workers authority over every aspect of steel production there. A company historian described it this way:

"The method of apportioning the work, of regulating the turns, of altering the machinery, in short, every detail of working the great plant, was subject to the interference of some busy body representing the Amalgamated Association. The

heats of a turn were designated, as were the weights of the various charges constituting a heat. The product per worker was limited; the proportion of scrap that might be used in running a furnace was fixed; the quality of pig-iron was stated; the puddlers' use of brick and fire clay was forbidden, with exceptions; the labor of assistants was defined; the teaching of other workmen was prohibited, nor might one man lend his tools to another except as provided for."

John Fitch confirmed this account of worker control at Homestead when he interviewed Homestead workers and managers in 1908. Fitch reported that:

"A prominent official of the Carnegie Steel Company told me that before the strike of 1892, when the union was firmly entrenched in Homestead, the men ran the mill and the foreman had little authority. There were innumerable vexations. Incompetent men had to be retained in the employ of the company, and changes for the improvement of the mill could not be made without the consent of the mill committees. I had opportunity to talk with a considerable number of men employed at Homestead before 1892, among them several prominent leaders of the strike. From these conversations I gathered little that would contradict the statement of the official, and much that would corroborate it."

The cooperative relationship between the skilled steelworkers and the steel employers became strained in the 1880's. The market for steel products began to expand rapidly.

Domestically the railroads began to generate high levels of demand for steel, and internationally the US steel industry began to compete successfully with the British and the German steel industry for the world market (In 1890, for the first time, U.S. steel exports surpassed those of Great Britain). The effect of this massive increase in demand was to intensify competition in the U.S. industry. What had been a stable market structure was disrupted by the new markets opening up.

Firms competed for the new markets by trying to increase their output and cut their costs. To do that they had to increase the productivity of their workers, but the labor system did not allow them to do that. For example, from 1880 on, the market price for iron and steel products was falling drastically, so that the price for bar iron was below the minimum specified in the Union's sliding scale, even though the negotiated minimum rates were also declining. This meant that employers were paying a higher percentage of their income out in wages than

they would have were the sliding feature of the sliding scale operative, or had they had the power to reduce wages unilaterally in the face of declining prices.

At the same time that their labor costs as a percentage of revenue were rising, the labor system also prevented employers from increasing their productivity through reorganizing or mechanizing their operations. The workers controlled the plants and decided how the work was to be done. Employers had no way to speed up the workers, nor could they introduce new machinery that eliminated or redefined jobs.

In the past, employers had introduced new machinery, but not labor-saving machinery. The many innovations introduced between 1860 and 1890, of which the most notable was the Bessemer converter, increased the size and capacity of the furnaces and mills, but they generally did not replace men with machines. Lowthian Bell, a British innovator, who toured the U.S. steel industry in 1890, reported that: "Usually a large make of any commodity is accomplished by a saving of labor, but it may be questioned whether in the case of the modern blast furnace this holds good. To a limited, but a very limited, extent some economy might be effected, but if an account were taken of the weight of material moved in connection with one of our Cleveland furnaces, and the number of men by whom it is handled, much cannot, at all events with us, be hoped for."

However, in the late 1880s and 1890s, the steel companies needed more than just bigger machines and better methods of metallurgy. Bottlenecks were developing in production, so that they needed to mechanize their entire operations. For example, the problem with pig-iron production, the first stage of steelmaking, was that with increased demand, the larger blast furnaces could produce pig iron faster than the men could load them, so that the use of manual labor became a serious hindrance to expanding output.

The steel masters needed to replace men with machines, which meant changing the methods of production. To do that, they needed to control production, unilaterally. The social relations of cooperation and partnership had to go if capitalist steel production was going to progress.

The steel companies understood this well and decided to break the union.

The strongest lodge of the Amalgamated Association was at Carnegie's Homestead mill; it is no wonder that the battle between capital and labor shaped

up there. In 1892, just before the contract with the Amalgamated was to expire, Carnegie transferred managing authority of the mill to Henry Clay Frick. Frick was already notorious for his brutal treatment of strikers in the Connellsville coke regions, and wasted no time making his intentions known at Homestead. He ordered a fence built, three miles long and topped with barbed wire, around the entire Homestead Works; he had platforms for sentinels constructed and holes for rifles put in along the fence and he had barracks built inside it to house strikebreakers. Thus fortified, Frick ordered 300 guards from the Pinkerton National Detective Agency, closed

down the Works, laid off the entire work force, and announced they would henceforth operate nonunion. The famous Homestead Strike began in 1892 as a lockout by the employers with the explicit aim of breaking the union. Dozens of men were killed in the four months that followed as the Homestead workers fought Pinkertons, scabs, the sheriff and the State Militia.

In the end, the intervention of the state and federal governments on the side of the Carnegie Corporation beat the strikers. The works were re-opened with strikebreakers, and Frick wrote to Carnegie, "Our victory is now complete and most gratifying. Do not think we will ever any serious labor trouble again."

The Homestead Strike was the turning point for the Amalgamated Association throughout the country. Other employers, newly invigorated by Frick's performance, took a hard line against the union, and the morale of the members, their strongest local broken, was too low to fight back. Within two years of the Homestead defeat the Amalgamated had lost 10,000 members.

Lodge after lodge was lost in the following years, so that membership, having peaked at 25,000 in 1892, was down to 10,000 by 1898, and most of that was in the iron industry. The union never recovered from these losses. The locals that remained were destroyed one-by-one by the U.S. Steel Corporation, so that by 1910 the steel industry was entirely non-union.

With the power of the Amalgamated broken, steel employers were left to mechanize as much as they needed. The decade that followed the Homestead defeat brought unprecedented developments in every stage of steel making. The rate of innovation in steel has never been equaled. Electric trolleys, the pig casting machine, the Jones mixer and mechanical ladle cars transformed the blast furnace. Electric traveling cranes in the Bessemer converter, and the Wellman in

the open hearth did away with almost all the manual aspects of steel production proper. And electric cars and rising ailing tables made the rolling mills a continuous operation. These developments led the British Iron and Steel Institute to conclude after its visit in 1903 that:

"The (U. S.) steel industry had made considerable advances in the ten years ending with 1890. It is, however, mainly since that year that the steel manufacture has made its greatest strides in every direction, and it is wholly since that date that costs have been so far reduced as to enable the United States to compete with Great Britain and Germany in the leading markets of the world."

One British economist, Frank Poppeiwell, was particularly amazed by the degree to which new innovations were labor saving. He concluded:

"Perhaps the greatest difference between English and American conditions in steel-works practice is the very conspicuous absence of laborers in the American mills. The large and growing employment of every kind of both propelling and directing machinery-electric trolleys, rising and falling tables, live rollers, side-racks, shears, machine stamps, endless chain tables for charging on the cars, overhead traveling cranes-is responsible for this state of things. It is no exaggeration to say that in a mill rolling three thousand tons of rails a day, not a dozen men are to be seen on the mill floor."

In this way, the steel masters succeeded in eliminating the bottlenecks in production by replacing men with machines at every opportunity. This mechanization would not have been possible without the employers' victory over the workers at Homestead. Thus we can see how the prize in the class struggle was control over the production process and the distribution of the benefits of technology. As David Brody summarizes it:

"In the two decades after 1890, the furnace worker's productivity tripled in exchange for an income rise of one-half; the steel workers output doubled in exchange for an income rise of one-fifth... At bottom, the remarkable cost reduction of American steel manufacture rested on

those figures. The accomplishment was possible only with a labor force powerless to oppose the decisions of the steel men."

The victory of the employers in 1892 allowed them to destroy the old labor system in the industry. They could then begin to create a new system, one that

would reflect and help to perpetuate their ascendancy. Specifically, this meant that they had three separate tasks: to adapt the jobs to the new technology; to motivate workers to perform the new jobs efficiently; and to establish lasting control over the entire production process. The next three sections of this paper will deal with each one of these in turn.

## **II: Effects of the New Technology on Job Structure**

Unlike earlier innovations in steelmaking, the mechanization of the 1890s transformed the tasks involved in steel production. The traditional skills of heating, roughing, catching and rolling were built into the new machines. Machines also moved the raw materials and products through the plants. Thus the new process required neither the heavy laborers nor the highly skilled craftsmen of the past. Rather, they required workers to operate the machines, to feed them and tend them, to start them and stop them. A new class of workers was created to perform these tasks, a class of machine operators known by the label "semi-skilled."

The new machine operators were described by the British Iron and Steel Institute after their visit in 1903 as men who "have to be attentive to guiding operations, and quick in manipulating levers and similarly easy work ... the various operations are so much simplified that an experienced man is not required to conduct any part of the process."

Similarly, the U.S. Department of Labor noted the rise of this new type of steelworker in their report of 1910:

"The semi-skilled among the production force consist for the most part of workmen who have been taught to perform relatively complex functions, such as the operation of cranes and other mechanical appliances, but who possess little or no general mechanical or metallurgical knowledge ... This class has been developed largely within recent years along with the growth in the use of machinery and electrical power in the industry. The whole tendency of the industry is to greatly increase the proportion of the production force formed by this semi-skilled class of workmen. They are displacing both the skilled and the unskilled workmen."

The semi-skilled workers were created by the downgrading of the skilled workers and the upgrading of the unskilled. These shifts proceeded throughout

the 1890s and early 1900s, as more and more plants were mechanized. Although there are no hard data on these shifts in job categories, they are reflected in the change in relative wage rates. Between 1890 and 1910, the hourly wages of the unskilled steelworkers rose by about 20 percent, while the daily earnings of the skilled workers fell by as much as 70 percent. Also after 1892, the wage differential between the various types of skilled workers narrowed substantially. Thus, the British iron-masters reported in 1903:

"The tendency in the American steel industry is to reduce by every possible means the number of highly-skilled men employed and more and more to establish the general wage on the basis of common unskilled labor. This is not a new thing, but it becomes every year more accentuated as a result of the use of automatic appliances which unskilled labor is usually competent to control."

The following table of wage rates for selected positions at the Homestead plant mill between 1892 and 1908 illustrates the fate of skilled workers throughout the industry. 1 Bear in mind that during this interval, their productivity was multiplying and wages throughout the nation were rising. Also, their workday was increased from 8 hours to 12 hours, so that the decline in daily earnings understates their reduction in real wages.

These reductions were part of the steel companies' policy of reducing the wage differentials between the classes of workers to make them more consistent with differentials in skill requirements for the different jobs. An official of one Pittsburgh steel Company put it this way: "... the daily earnings of some of the most highly paid men have been systematically brought down to a level consistent with the pay of other workers, having in mind skill and training required and a good many other factors."

The other side of the picture was the upgrading effect that the new technology had on the unskilled workers. Their wages were increased considerably during that same period. In part this was accomplished by a raise in the hourly rate for unskilled labor, from 14 Cents per hour in 1892 to 17.5 cents in 1910, and in part it was the result of the steel companies putting more men on tonnage rates, enabling them to make higher daily earnings.

Many unskilled workers were put in charge of expensive machinery and made responsible for operating it at full capacity. Fewer and fewer men were hired just to push wheelbarrows and load ingots, so that, as an official of the Pennsylvania

Steel Company said, "While machinery may decrease the number of men, it demands a higher grade of work men." Thus, the effects of the new technology were to eliminate the distinction between skilled and unskilled workers and create a largely homogeneous workforce.

### III Solving the Labor Problem

Having become the unilateral controllers of steel production, the employers created for themselves the problem of labor discipline. When the skilled workers had been partners in production, the problem of worker motivation did not arise. Skilled workers felt that they were working for themselves because they controlled the process of production. They set their own pace and work load without input from the bosses. When this system was broken, how hard workers worked became an issue of class struggle.

The introduction of the new technology introduced in the 1890s narrowed the skills differentials between the two grades of workers, producing a work force predominantly "semi skilled." This homogenization of the work force produced another new "problem" for the employers. That is, without the old skilled/unskilled dichotomy and the exclusiveness of the craft unions, the possibility that workers might as a class unite to oppose them was greater than ever. Frederick Winslow Taylor, the renowned management theorist who began his career as a foreman in a steel plant, warned employers of this danger in 1905:

"When employers herd their men together in classes, pay all of each class the same wages, and offer none of them inducements to work harder or do better than the average, the only remedy for the men comes in combination; and frequently the only possible answer to encroachments on the part of their employers is a strike."

Ultimately, however, both the problem of worker motivation and the problem of preventing unified opposition were the same problem. They both revolved around the question of controlling worker behavior. To do that, employers realized they had to control their perceptions of their self-interest. They had to give them the illusion that they had a stake in production, even though they no longer had any real stake in it. This problem was known as

"the labor problem."

To solve the labor problem, employers developed strategies to break down the basis for a unity of interest amongst workers and to convince them that, as individuals, their interests were identical with those of their company.

Out of these efforts, they developed new methods of wage payments and new advancement policies, which relied on stimulating individual ambition. They were designed to create psychological divisions among the workers, to make them perceive their interests as different

from, indeed in conflict with, those of their co-workers. Employers also began to use paternalistic welfare policies in order to win the loyalty of their employees. The effect of all these new policies was to establish an internal labor market in the major steel companies, which has lasted, in its essentials, until today.

### *1. Development of Wage Incentive Schemes*

With the defeat of the Amalgamated Association, the entire complex traditional system of wage payments collapsed. The sliding scale of wages for paying skilled workers and the contract system for paying their helpers rapidly declined. Employers considered them a vestige of worker power and rooted them out of shop after shop. Thus, the employers had the opportunity to establish unilaterally a new system of wage payment. Initially, they began to pay the new semi-skilled men day wages, as they had paid the unskilled workers. Soon, however, they switched to the system of piece work, paying a fixed sum for each unit the worker produced.

The most obvious function of piece work was, of course to increase output by making each worker drive himself to work harder. Employers also contended that the system was in the workers' best interests because it allowed each one to raise his own wages. However, the employers soon found that straight piece work gave the workers too much control over their wages. That is, when it succeeded in stimulating workers to increase their output, their wages soared above the going rate. Employers would then cut the piece rates to keep the wages in line. Once they did that, however, they had reduced the piece rate system to simple speed-up; a way of getting more work for the same pay. Workers responded to the rate cuts by collectively slowing down their output, so that the system defeated itself, leaving employers back where they had started. "Wage payment Systems: How to Secure the Maximum Efficiency of Labor," gives an interesting account of this process:

"It is in the administration of the piece work system that manufacturers, sooner or later, make their great mistake and over-reach themselves, with the result that the system becomes a mockery and the evil conditions of the old day work

system reappears. Regardless of the continually increasing cost of living, the manufacturers decide among themselves, for example, that \$1.50 for 10 hours is enough for a woman and that \$2.50 a day is enough for the ordinary workingman and a family. The piece work prices are then adjusted so that the normal day's output will just bring about these wages... Immediately throughout the entire shop the news of the cuts is whispered about... with the result that there is a general slowing down of all producers."

Thus, employers began to experiment with modifications of the piece rate. They developed several new methods of payment at this time, known as "premium" or "bonus" plans. These differed from piece work only in that they gave the workers smaller increments in pay for each additional piece.

The Halsey Premium Plan, developed in 1891, served as a model for most of the others. It called for establishing a base time period for a job, and setting one rate for workers who completed the job in that period. If a worker could finish the job faster, then he received a bonus in addition to the standard rate. The bonus was figured so that only a part of the money saved by the worker's extra productivity went to him, the rest going to the company. Different plans varied according to how they set the base time period and the base wage, and how they divided the more efficient workers' savings between the worker and the company. Iron Age recommended one particular variation, called the Half and Half Premium Plan, in which the rule was "to pay the more efficient workman only one-half what he saves by 1 up." The article described one example where, under the plan,

"For every extra \$1 the man earned by his extra effort, the manufacturers would gain \$7. Not a bad investment, this premium system. It better the workingman's condition materially, and, best of all, improves his frame of mind."

Frederick Winslow Taylor's Differential Piece Rate is basic 1 another variation of the Halsey Premium Plan. Under Taylor's system, the employer established two separate rates, a low day rate for the "average workman" and a high piece rate for the "first class workman," with the stipulation that only the fast and efficient workmen were entitled to the higher rate. He suggests setting the high rate to give the worker about 60 percent increase in earnings, and for this the employer would demand of him a 300-400 percent increase in output. Like the Halsey Plan, it was simply the piece rate system modified to give the worker diminishing returns for his extra effort.

In order for any of the output incentive plans to work, management had to be able to measure each worker's output separately. All of the premium plans stressed the importance of treating each worker individually, but only Taylor gave them a method for doing so. His great contribution was systematic time study giving employers a yardstick against which to measure an individual's productivity. The emphasis on individual productivity measures reinforced the fragmenting effect of the plans. As Taylor said about his experience implementing the system at the Bethlehem Steel Works:

"Whenever it was practicable, each man's work was measured by itself ... Only on a few occasions and then upon special permission (...) were more than two men allowed to work on gang work, dividing their earnings between them. Gang work almost invariably results in a falling off of earnings and consequent dissatisfaction."

Output incentives were designed to increase individual worker output. Employers understood that to do that, they had to play upon individual worker's ambitions, which meant breaking down workers' collective identity. They gave each worker inducement to work harder, and also divided the workers into different groups, according to their output. Thus, output incentives served as a lever to prevent workers from taking collective action. As one manufacturer explained in 1928, he had originally adopted output incentives

"To break up the flat rate for the various classes of workers. That is the surest preventative of strikes and discontent. When all are paid one rate, it is the simplest and almost inevitable thing for all to unite in the support of a common demand. When each worker is paid according to his record there is not the same community of interest. The good worker who is adequately paid does not consider himself aggrieved so willingly nor will he so freely jeopardize his standing by joining with the so-called 'Marginal Worker.' There are not likely to be union strikes where there is no union of interest."

Quite explicitly, then, the aim of the premium plans was to break up any community of interest that might lead workers to slow their pace (what employers call "restriction of output") or unite in other ways to oppose management. They were a weapon in the psychological war that employers were waging against their workers, and were, at least for a while, quite successful.

Between 1900 and World War I, piecework and premium plans became more

and more prevalent in the steel industry. Steelworkers opposed the new methods of payment, and the residual unions in the industry raised objections at every opportunity. In one instance, at Bethlehem Steel's South Bethlehem Works, opposition to the bonus system exploded into a major strike in February, 1910. Approximately 5,000 of the 7,000 workers there went out on strike spontaneously. The strike lasted several weeks, during which time one man was killed and many were injured. Strike demands were drawn up separately by each department or group of workers, and every single one called for uniform rates of pay to be paid by the hour,

and time-and-a-half for overtime. Several added to that an explicit demand for the elimination of piece work and a return to the "day-work" system. A U.S. Senate Investigation into the strike found that the "Time-Bonus" System in use was one of its major causes."

However, worker opposition proved ineffective in preventing the use of output incentive schemes. Since 1892, the employers had held the upper hand in the industry, and they used it to perpetuate their power. The wage incentive schemes were aimed at doing just that.

**2. New Promotion Policies & the Development of Job Ladders** As we saw above, the new technology diminished the skill requirements for virtually all the jobs involved in making steel. Charles Schwab himself said in 1902 that he "take a green hand, say a fairly intelligent agricultural laborer, and make a steel melter of him in six or weeks." When we realize that the job of melter was the most highly skilled job in the open hearth department, we can see how narrow the skill range in the industry really was. The employers knew this, and put their knowledge to good use during strikes. For example, during a strike at the Hyde Park Mill in 1901:

"It was resolved that the works should be continued with green hands, aided by one or two skilled men who remained loyal. The five mills thus manned were started on the 3rd of August, and up to the date of my visit, near the end of October, they had not lost a single turn."

Around the turn of the century, employers began to recognize the dangers inherent in the homogenization of the work force. They formulated this problem as worker discontent caused by "dead-end" jobs. Meyer Bloomfield, an industrial manager who in 1918 wrote a textbook on factory management,

summarized their discussion on this subject:

"A good deal of literature has been published within the last dozen years in which scathing criticism is made of what has come to be known as 'blind alley' or 'dead-end' jobs. By these phrases is meant work of a character which leads to nothing in the way of further interest, opportunity, acquisition of skill, experience, or anything else which makes an appeal to normal human intelligence and ambition. The work itself is not under attack as much as the lack of incentive and appeal in the scheme of management."

Bloomfield says right off, then, that the problem of "dead-end" jobs need not be solved by changing the jobs themselves. The better solution is to change the arrangement of the jobs.

To do this, he says:

"A liberal system of promotion and transfer has therefore become one of the most familiar features of a modern personnel plan, and some of the most interesting achievements of management may be traced to the workings of such a system."

The response of employers to the newly homogenized jobs was to create strictly demarcated job ladders, linking each job to one above and one below it in status and pay to make a chain along which workers could progress. As Bloomfield remarked, "what makes men restless is the inability to move, or to get ahead."

The establishment of a job ladder had two advantages, from the employers' point of view.

First, it gave workers a sense of vertical mobility, and was an incentive to workers to work harder. Secondly it gave the employers more leverage with which to maintain discipline. The system pitted each worker against all the others in rivalry for advancement and undercut any feeling of unity which might develop among them. Instead of acting in concert with other workers, workers had to learn to curry favor with their foremen and supervisors, to play by their rules, in order to get ahead. As one steelworker described the effect this had on workers during the 1919 organizing campaign, "Naw, they won't join no union; they're all after every other feller's job." This competition also meant that workers on different ladder rungs had

different vested interests, and that those higher up had something to lose by offending their bosses or disrupting production.

As early as 1900, Iron Age was advising employers to fill production work vacancies from inside the firm. They advocated a policy of hiring only at the lowest job levels and filling higher jobs by promotion; what contemporary economists refer to as limiting the ports of entry.

The principle of internal promotion was expounded by Judge Gary, the President of the U.S.

Steel Corporation, in his dealings with the subsidiaries. For example, in a speech to the presidents of the subsidiary companies in 1922, Gary said:

"We should give careful thought to the question as to who could be selected to satisfactorily fill any unoccupied place; and like suggestions should be made to the heads of all departments. Positions should be filled by promotions from the ranks, and if in any locations there are none competent, this fact should be given attention and men trained accordingly. It is only necessary to make and urge the point. You will know what to do; if indeed any of you has not already well deliberated and acted upon it."

These policies explain the rigid lines of promotion that John Fitch found in each department.

He described the workforce as "pyramided and... held together by the ambition of the men lower down."

In this way, the steel companies opened up lines of motion in the early years of the century by creating job ladders. Employers claimed that each rung of the ladder provided the necessary training for the job above it, but the skilled jobs in the steel industry had been virtually eliminated and production jobs were becoming more homogenous in their content.

If, as Charles Schwab said, one could learn to be a melter in six weeks, then certainly the training required for most jobs was so minimal that no job ladder only the minimum of job tenure were needed to acquire the necessary skills.

While technological development made it possible to do away with distinctions between skilled and unskilled workers, employers introduced divisions to avoid

the consequences of uniform and homogeneous work force. The minutely graded job ladders were developed as a solution to the "labor problem," rather than a necessary input for production itself.

#### **IV: The Redivision of Labor**

While employers were developing new systems for managing their work forces, they also altered the definition of jobs and the division of labor between workers and management.

They did this by revising the training mechanism for skilled workers, retraining the foremen, and changing their methods of recruiting managers. The result of these changes was to take knowledge about production away from skilled workers, thus separating "physical work"

from "mental work." This further consolidated the employers' unilateral control over production, for once all knowledge about production was placed on the side of management; there would be no way for workers to carry on production without them. Frederick Winslow Taylor was one of the first theorists to discuss the importance of taking all mental skills away from the worker. In his book *Principles of Scientific Management* (1905), he gives a description of the division of knowledge in the recent past:

"Now, in the best of the ordinary types of management, the managers recognize the fact that the 500 or 1000 workmen, included in the twenty or thirty trades, who are under them, possess this mass of traditional knowledge, a large part of which is not in the possession of the management. The management, of course, includes foremen and superintendents, who themselves have been in most cases first-class workers at their trades. And yet these foremen

and superintendents know, better than anyone else, that their own knowledge and personal skill falls far short of the combined knowledge and dexterity of all the workmen under them."

Taylor insists that employers must gain control over this knowledge. In his manual *Shop Management*, he says quite simply, "All possible brain work should be removed from the shop and centered in the planning or laying-out department."

Taylor suggested several techniques for accomplishing this. They were all based

on the notion that work was a precise science, that there was "one best way" to do every work task, and that the duty of the managers was to discover the best way and force all their workmen to follow it. Taylorites used films of men working to break down each job into its component motions, and used stop watches to find out which was the "one best way" to do them. Taylor also insisted that all work should be programmed in advance, and coordinated out of a

"planning department." He gives elaborate details for how the planning department should function; using flow charts to program the entire production process and direction cards to communicate with foremen and work men. These were called "routing" systems. One historian summarizes this aspect of scientific management thus:

"One of the most important general principles of Taylor's system was that the man who did the work could not derive or fully understand its science. The result was a radical separation of thinking from doing. Those who understood were to plan the work and set the procedures; the workmen were simply to carry them into effect."

Although most steel executives did not formulate the problem as clearly as Taylor, they did try to follow his advice. Around 1910, they began to develop "dispatch systems" to centralize their knowledge about production. These systems consisted of a series of charts showing the path of each piece of material as it made its progress through the plant and how much time each operation took, enabling the supervisors to know exactly where each item was any point in time.

At the same time that they systematized their own knowledge about production, the steel companies took that knowledge away from steelworkers. Previously, the skilled steelworkers, acting in teams, possessed all of the skills and know-how necessary to make steel. They also had had authority over their own methods of work. Now employers moved to transfer that authority to the foremen and to transfer that knowledge to a new stratum of managers. This section will describe and document that process, in order to show that this re-division of labor was not a necessary outgrowth the new technology, but rather was an adaptation by employers to meet their own needs, as capitalists, to maintain discipline and control.

## *1. The New Skilled Workers*

As we have seen, the mechanization of production largely eliminated the role of the traditional skilled worker. However, the steel industry still needed skilled workers. Machines required skilled mechanics to perform maintenance and repair work. Also, certain skills were needed for specialized production processes which had not yet been mechanized. However, these skilled workmen were very different from the skilled workmen of the 19th century, who collectively possessed all of the skills necessary to produce steel. The new skilled workers had skills of a specific nature that enabled them to perform specific tasks, but did not have a general knowledge of the process of production. This new type of skilled worker had to be created by the employers.

One would think that finding skilled men should have been no problem because of the huge numbers of skilled workers who were displaced and down-graded in the 1890s. However, by 1905, employers' associations began to complain about the shortage of skilled men. The reason for this paradox is that when the employers destroyed the unions and the old social

relations, they destroyed at the same time the mechanism through which men had received their training.

Previously, the selection, training, and promotion of future skilled steelworkers had been controlled by the skilled craftsmen and their unions. After the union was destroyed, the skilled workers were no longer able to hire and train their own helpers. Within a few years, employers, realizing that no new men were being trained, began to worry about their future supply of skilled workers.

In order to create new skilled workers, employers set up a training system that was an alternative to the union-controlled apprenticeship system of the past, known as the "short course." The "short course" involved a manager or superintendent taking a worker who had been in a department for long enough to get a feel for the process, and giving him individualized instruction in some specialized branch of the trade. By using the short course, employers could train men for specific skilled jobs in a limited period of time.

In this way, a new class of skilled workers was created during the first two decades of the 20th Century. These workers were selected by the employers, trained in a short period of time, and then set to work with their job-specific

skill. These workers had skills which were only good for one job. They did not have the independence of the 19th Century skilled workmen, whose skills were transferable to other jobs and other plants. Nor did they have the generalized knowledge of the production process that skilled workers previously possessed.

The knowledge they had was that which could serve their employer, but not that which could serve themselves. As *Iron Age* advertised in 1912:

"Make your own mechanics... The mechanics that you will teach will do the work your way.

They will stay with you, as they are not sure they could hold jobs outside."

## *2. Changing Role of the Foreman*

As the employers expanded their control over the process of production, they realized they had to develop an alternative means for exercising control on the shop floor. Just as they had taken knowledge about production away from the skilled workers, they also took away their authority over their own labor and that of their helpers. Now, the task of regulating production was transferred to the foremen, who previously only had authority over the pools of unskilled workers. Foremen were now seen as management's representatives on the shop floor. To do this, employers had to re-define the job of foreman and retrain the men who held those jobs.

In order to transfer authority to the foremen, the employers had to distinguish them from the skilled workers. This distinction had to be created; it did not evolve out of the new technology. Foremen were recruited from the ranks of the skilled workers; foremanship being the highest position to which a blue-collar worker could aspire. Once there however, steel employers had to re-educate them as to their role in production. The re-education began with convincing them not to do manual work, which was no easy task. An editorial in *Iron Age* in 1905 quotes one superintendent lecturing an audience of foremen as saying:

"You men have no business to have your coats off when on duty in your shops unless you are warm. You have no business to take the tools out of a workman's hands to do his work. Your business is to secure results from other men's work."

The editorial goes on to say why this is important:

"A man cannot work with his hands and at the same time give intelligent supervision to a gang of men, and a foreman who does this is apt to lose the control of his men while he is weakening the confidence of his employers in his ability as a general."

The foreman's job was to direct and correct the work but never to do the work himself. His authority depended upon that. Foremen, as the lowest ranking "mind" workers had to be made distinct from the manual workers. One steel company official likened the organization of authority to that of the "army, with the necessary distinction between the commissioned officers and the ranks."

The companies had to give their foremen special training courses in order to make them into bosses. These courses were designed to teach the foremen how to "manage" their men. One such course, at the American Steel and Wire Company, a U.S. Steel subsidiary, spent most of its time on that subject with only a few sessions on production techniques or economics.

This development was not unique to the steel industry throughout American industry; special foremen's training courses were becoming prevalent. Dr. Hollis Godfrey, President of the Drexel Institute in Philadelphia, the first private institution concerned solely with foremen's training, said that the purpose of foremen training was to:

"Make the skilled mind worker. The skilled mind worker is a little different proposition than the skilled hand worker, and a great many people are still wandering around in the differentiation between the two... From the foreman to the president right straight through, you have got one body of mind workers, and they do but two things: they organize knowledge and then they use the knowledge as organized."

Although foremen did little work, they also did little thinking. Most of their training was designed to teach them how to maintain discipline, techniques for handling men, developing

"team work," deciding who to discharge and who to promote. They were the company's representative in the shop, and as the companies consolidated their power over the workers, the strategic importance of the foremen increased.

### *3. New Types of Managers*

Just as the authority that the skilled workers had previously possessed was transferred to the foremen, their overall knowledge about production was transferred to a new class of managers, recruited from the public and private schools and their own special programs.

These managers became the bottom rung of the management hierarchy.

Before 1900, most managers in the steel industry were men who had begun at the bottom and worked their way all the way up. Andrew Carnegie had insisted on using this method to select his junior executives. As he once said, boasting, "Mr. Morgan buys his partners, I grow my own." Carnegie developed a whole partnership system for the management of his empire based on the principle of limitless upward mobility for every one of his employees.

Around the turn of the century, employers began to choose college graduates for their management positions. As one prominent steel official told a member of the British Iron and Steel Institute in 1903: "We want young men who have not had time to wear themselves into a groove, young college men preferably..."

This was not mere philosophy; the British visitors found on their tour that, of the 21 blast furnaces they visited, "18 were managed by college graduates, the majority of whom were young men."

Employers used publicly-funded technical colleges to train their new managers. Technical colleges were new, established with the support of the business community and over the protest of the labor movement. As Paul Douglas wrote in 1921:

"Employers early welcomed and supported the trade-school, both because they believed that it would provide a means of trade-training, and because they believed that it would remove the preparation for the trades from the potential or actual control of unions."

Some steel employers also set up their own schools. Technical training alone, however, was not sufficient to produce competent managers for steel factories. The young men also needed to know about steel-making. To meet this need, the steel companies developed a new on-the-job training program to supplement the formal learning of their young college graduates. This program consisted of short rotations in each mill department under the supervision of a foreman or superintendent, which gave the men experience in every aspect of mill work.

before they were put in managerial positions. This program was called an "apprenticeship,"

and although it trained managers instead of workers, it was an apprenticeship by the original meaning of the word. It gave the apprentices knowledge of each stage of the production process.

By the 1920s, such methods were nearly universal through it the industry. Charles Hook, the Vice President of the American Rolling Mill Company, a U.S. Steel subsidiary, described his method for selecting and training managers in a speech of 1927 to the International Management Congress:

"The condition as outlined respecting the selection of the 'skilled' employee is quite different from the condition governing the selection of the man with technical education.

Each year a few second- and third-year (college) men work during the summer vacation, and get first-hand knowledge of mill conditions. This helps them reach a decision. If, after working with us for a summer, they return the next year, the chances are they will remain permanently... Some of our most important positions; positions of responsibility requiring men with exceptional technical knowledge filled by men selected in this manner."

The prospective managers, in short, were increasingly recruited from the schools and colleges, not from the shops.

In these apprenticeship programs, a distinction was often made between different types of apprentices, distinguished by their years of schooling. Each type was to be trained for positions at different levels of responsibility. For example, at the Baldwin Works, there were three classes of apprentices, such that:

"The first class will include boys seventeen years of age, who have had a good common school (grammar school) education ... The second class indenture is similar to that of the first class, except that the apprentice must have had an advance grammar school (high school) training, including the mathematical courses usual in such schools... The third class indenture is in the form of an agreement made with persons twenty-one years of age or over, who are graduates of colleges, technical schools, or scientific institutions..."

Thus, formal education was beginning to become the criterion for separating

different levels of the management hierarchy, as well as separating workers from employers.

During this period, employers re-divided the tasks of labor. The knowledge expropriated from the skilled workers was passed on to a new class of college trained managers. This laid the basis for perpetuating class divisions in the society through the educational system.

Recently several scholars have shown how the stratification of the educational system functions to reproduce society's class divisions. It is worth noting that the educational tracking system could not work to maintain the class structure were it not for the educational requirements that were set up at the point of production. These educational requirements came out of the need of employers to consolidate their control over production.

Within management, the discipline function was divided from the task of directing and coordinating the work. This is the basis for today's distinction between "staff" and "line"

supervision. We must hypothesize that this division, too, had its origin in the desire of steel employers to maintain control over their low level managerial staff.

The effect of this re-division of labor on the worker was to make his job meaningless and repetitious. He was left with no official right to direct his own actions or his own thinking. In this way, skilled workers lost their status as partners, and became true workers, selling their labor and taking orders for all of their working hours.

## V. To the Present

The labor system set up by the steel employers early in the century has not changed significantly since 1920. The essentials of the system; wage incentives, job ladders, welfare schemes, and a division of labor that kept skills highly job-specific have lasted to the present.

The only major change in the industry's labor relations has been the union organizing drive of the 1930s, culminating in the establishment of the United Steelworkers of America, affiliated with the Congress of Industrial Organizations (CIO). The union brought steelworkers job security and raised wages. For the first time, it gave workers a voice in the determination of working hours, working conditions, and fringe benefits. However, the presence of the union did not change the basic mechanisms of control that employers had established. Although the union was able to alter the manner in which employers exercised control, it never challenged the heart of this control as institutionalized in the labor system.

The effect of the union was to re-rationalize the wage structure which employers had set up earlier. By the 1930s, small changes in the content of different jobs had eroded the earlier system and left the wage structure exceedingly complex and chaotic. What the union did, under the direction of the War Labor Board during the 1940s, was to work with the employers to streamline the old hierarchical system through a mammoth effort to re-evaluate and re-classify 50,000 job titles. The result was that they pegged every job to one of 30 job classifications, which they put in a strict order with a 3.5 [cent] differential between them.

This structure remains today, except the differential is now 7 cents.

The impact of the union on promotion policies was to do away with favoritism and insist that seniority be used to regulate promotion and bumping. This also served to rationalize the old structure, by giving it a basis in fairness rather than the foreman's whim. However, it did not get rid of the divisive effects of the job ladders themselves.

Unionization failed to change the re-division of labor through which employers

took knowledge about the production process away from the workers. The union did demand a say in the establishment and operation of training programs, but it did not question the content of the training courses.

In contrast, the American Federation of Labor, in 1940, adopted a position on training that insisted on the use of apprenticeship instead of skill-specific training. The difference between the steelworker's union and the AFL position on training no doubt stems from the fact that the AFL was composed of craft unions, which were ever conscious of the monopoly-power of their craft skills, while the former was composed of steelworkers whose craft skills had been taken from them long ago. The steelworkers probably did not consider the possibility that their skills could be other than job-specific. Such was the success of the earlier re-division of labor.

The other side of this coin, as we saw earlier, was the transferring of generalized knowledge to the managers, and the use of educational requirements to distinguish managers from workers. A study by the International Labor Organization in 1954 found that in the United States

"More often than not, future supervisors are taken on by the companies as soon as they leave college and they start their careers with a spell of six months or a year as workmen in one of the departments in the plant."

The International Labour Organization in another found that the steel companies were still concerned with the problems of establishing status relations between supervisors and workers, and solved it by giving "supplementary training which is essential once supervisors have been appointed in order to raise and define their status in relation to their subordinates and to ensure that their activities and those of the management are fully coordinated."

The presence of the union did, however, make some difference regarding the authority of the foremen in the steel industry. The establishment of formal grievance procedures and seniority as a basis for promotion undercut the power that foremen had held in the shop floor.

## VI. Conclusions

The period between 1890 and 1920 was a period of transition in the steel industry from a labor system controlled by the skilled workers to a labor system controlled by the steel employers. In that transition, the breaking of the skilled workers' union, which was the institutional expression of their control over the production process, was only the first step.

Once the union was destroyed, labor discipline became a problem for the employers. This was the two-fold problem of motivating workers to work for the employers' gain and preventing workers from uniting to take back control of production. In solving this problem, employers were creating a new labor system to replace the one they had destroyed.

All of the methods used to solve this problem were aimed at altering workers' ways of thinking and feeling; which they did by making workers' individual "objective" self-interests congruent with that of the employers and in conflict with workers' collective self-interest.

The use of wage incentives and the new promotion policies had a double effect on this issue.

First, they comprised a reward system, in which workers who played by the rules could receive concrete gains in terms of income and status. Second, they constituted a permanent job ladder so that over time this new reward system could become an accepted fact by new workers coming into the industry. New workers would not see the job ladders as a reward and incentive system at all, but rather as the natural way to organize work and one which offered them personal advancement. In fact, however, when the system was set up, it was neither obvious nor rational. The job ladders were created just when the skill requirements for jobs in the industry were diminishing as a result of the new technology, and jobs were becoming more and more equal as to the learning time and responsibility involved.

The steel companies' welfare policies were also directed at the attitudes and perceptions of the workers. The policies were designed to show the workers that it was to their advantage to stay with the company. This policy, too, had both

short-term and long-term advantages for the steel employers. In the short run, it was designed to stabilize the work force by lowering the turnover rate, thus cultivating a work force who was rooted in the community and who had much to lose by getting fired or causing trouble. In the long run, the policies were supposed to prevent workers from identifying with each other across company and industry lines, thus preventing the widening of strike movements into mass strikes.

Employers also sought to institutionalize and perpetuate their newly-won control over production by re-dividing the tasks of production so as to take knowledge and authority away from the skilled workers and creating a management cadre able to direct production. This strategy was designed to separate workers from management permanently, by basing that separation on the distinction between physical and mental work, and by using the educational system to reinforce it. This deterred workers from seeing their potential to control the production process.

Although this paper has concentrated on the steel industry, the conclusions it reaches are applicable to many other industries in the United States. The development of the new labor system in the steel industry was repeated throughout the economy in different industries. As

in the steel industry, the core of these new labor systems was the creation of artificial job hierarchies and the transfer of skills away from workers to the managers.

Technological innovations in every major industry around the turn of the century had the effect of squeezing the skill levels of the work force, turning most workers into semi-skilled machine operators. Paul Douglas, writing in 1921, found that the skill requirements were practically negligible in most of the machine building and machine using industries, especially the steel, shoe, clothing, meat-packing, baking, canning, hardware, and tobacco industries.

While jobs were becoming more homogeneous, elaborate job hierarchies were being set up to stratify them. Management journals were filled with advice on doing away with "dead-end"

jobs, filling positions by advancement from below, hiring only unskilled workers for the lowest positions, and separating men into different pay classes. This

advice was directed at the problem of maintaining "worker satisfaction" and preventing them from "restricting output"-i.e., fragmenting discontent and making workers work harder. Thus the creation of the internal labor market throughout American industry was the employers' answer to the problem of discipline inherent in their need to exert unilateral control over production. Were it not for that, a system of job rotation, or one in which the workers themselves allocated work would have been just as rational and effective a way of organizing production.

At the same time, employers began a process which they called the "transfer of skill." This meant giving managers the skills and knowledge that workers had previously possessed.

They began to use technical colleges and set up their own programs to train managers in production techniques. This development was aided by the methodology scientific management, as Paul Douglas pointed out:

"The amount of skill which the average worker must possess is still further decreased by the system of scientific management. The various constituent parts of the system, motion study, the standardization of tools and equipment, the setting of the standard task, routing, and functional foremanship, all divest the individual operative of much of the skill and judgment formerly required, and concentrate it in the office and supervisory force."

Likewise, Samuel Haber, a historian studying the progressive period, says "The discovery of a science of work meant a transfer of skill from the worker to management and with it some transfer of power." Like the creation of job hierarchies, this transfer of skill was not a response to the necessities of production, but was, rather, a strategy to rob the workers of their power.

For the skills which were still needed on the shop floor, employers instituted changes in the methods for training workers that reduced their skills to narrow, job-specific ones. The basic social inefficiency of this policy should be obvious. In an era of rapidly changing products and production techniques, jobs and industries are constantly changing, causing major dislocations in the work force. Therefore, the rational job training policy would be to give people as broad a range of skills and understanding of modern technology as possible, so that they could be flexible enough to weather the shifts in technology and the economy through their capacity to change jobs. Instead, the system of job-specificity

creates one aspect of what economist's label "structural unemployment" by molding workers to single skill-specific occupations. This policy wastes both individual lives and socially-useful labor power.

To varying degrees, the labor movement was aware of these developments while they were occurring. Many unions in the American Federation of Labor developed an early opposition to piece rates, and especially to bonus systems of Halsey, Taylor, and others. In 1903, the International Association of Machinists expressed their opposition to "work by the piece, premium, merit, (or) task," and prohibited its members from accepting such work. In 1906,

the Brotherhood of Locomotive Engineers successfully refused to accept the bonus system of the Sante Fe Railroad. In 1907, the Molders Union, the Boot and Shoe Workers, and the Garment Workers all resisted the bonus and premium systems. In general, unions opposed both the piece work and the bonus systems, although an opinion poll of union policies conducted in 1908-09 showed that "unions almost without exception prefer the straight piece system to premium or bonus systems." In 1911, the Executive Council of the American Federation of Labor passed a resolution condemning "the premium or bonus system (because it would) drive the workmen beyond the point necessary to their safety."

The growing opposition to scientific management in the labor movement went beyond a critique of the speed-up aspects of the bonus system. Samuel Gompers, founder and president of the AFL, was aware that Taylor's system meant the elimination of the role of the skilled craftsmen upon which the entire AFL was based. After reading Taylor's book *Shop Management*, he wrote to AFL Vice-President Duncan in 1911 that "I have no doubt that it would mean (the destruction of unionism) for it would reduce the number skilled workers to the barest minimum and impose low wages upon those of the skilled who would be thrown into the army of the unskilled."

The Machinists' Union was one of the more vocal in its fear of this aspect of scientific management. According to Milton Nadworny, in his book *Scientific Management and the Unions*, the IAM's "Official Circular No. 2":

"Revealed the craftsman's fear of a system which not only instituted a revolutionary approach to work, but which threatened to reduce his importance in the shop. The machinist, it contended, was no longer required to use his skilled judgment; the planning department provided full instructions; no longer

was his 'honor' relied upon the stop watch determined the time of his job. To complete the scheme, the possibility of organized retaliation against the system was prevented because only individual bargaining was permitted."

The Industrial Workers of the World had an even deeper understanding of the new labor system that was emerging and the dangers it posed to the working class as a whole. In the Manifesto of 1905, announcing the IWW founding convention, they warned that:

"Laborers are no longer classified by difference in trade skill, but the employer assigns them according to the machine to which they are attached. These divisions, far from representing differences in skill or interests among the laborers, are imposed by the employers that workers may be pitted against one another and spurred to greater exertion in the shop, and that all resistance to capitalist tyranny may be weakened by artificial distinctions."

The IWW understood the full implications of the developments of hierarchy at the point of production. However, they failed, as has every other labor organization in this century, to develop a successful strategy for countering it on the shop floor.

Under the old labor market system, the capitalists reaped profits from the production process but did not direct production themselves. The transition that this paper has described is the process by which capitalists inserted themselves into a central position of control over production. As Karl Marx, in writing about this transition, put it, "In the course of this development, the formal subjection is replaced by the real subjection of labor to capital."

Labor market institutions are best understood in their historical context, as products of the relations between classes in capitalist society. Labor market institutions are both produced by and are weapons in the class struggle. Technology plays only a minor role in this process.

Technological innovations by themselves do not generate particular labor market institutions; they only redefine the realm of possibilities. The dynamic element is the class struggle itself,

the shifting power relations between workers and employers, out of which the institutions of work and the form of the labor market is determined.

The institutions of labor, then, are the institutions of capitalist control. They could only be established by breaking the power of the industrial craftsmen. Any attempt to change these institutions must begin by breaking the power the Capitalists now hold over production. For those whose objective is not merely to study but to change, breaking that power is the task of today. When that is done, we will face the further task of building new labor institutions, institutions of worker control.

*Text from [www.prole.info](http://www.prole.info), originally from *The Rise of the Workers Movement*, edited by Root*

*& Branch.*



1. libcom note: unfortunately the table is not available in the online version